CHAPTER-10
SUMMARY AND CONCLUSION

10.1 INTRODUCTION

M/s. Shree Warad Alloys (P) Ltd., Nagpur a private limited company having its registered office at Plot No. C-1, Sharvari Apartments, 8/B, Trimurty Nagar, Ring Road, Jaitala Sq., Nagpur, Maharashtra State is proposing to establish an Greenfield project for manufacturing Ferro Alloys, Sponge Iron and power generation using Waste Heat Recovery Boiler (WHRB) at Bijabhat Village, Bemetara Tehsil, Durg District, Chhattisgarh State.

As per EIA notification SO No 1533 issued on 14th September, 2006 and its subsequent amendments the proposed project is falling under Project / Activity 3(a) – Metallurgical Industries (Ferro &Non Ferrous) and Category A – Primary metallurgical industry all projects, and requires Environmental Clearance from Expert Appraisal Committee (EAC), MOEF, New Delhi. Shree Warad Alloys (P) Ltd has submitted Form 1 application for obtaining Terms of Reference (TOR) from EAC.

The proposal was considered by the Expert Appraisal Committee during its 16th Meeting of the Expert Appraisal Committee (Industry - 1) held during 24th November, 2010 for determination of the Terms of Reference for undertaking detailed EIA Study in accordance with the provisions of the EIA notification dated September 14, 2006. The EAC has given Terms of Reference vide its Letter No. J-11011/380/2010-IA-II (I) dated: 20th October 2010.

10.2 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

The proposed Ferro Alloys manufacturing plant consists of 2 x 2.5 MVA Submerged Electric Arc Furnace, Sponge Iron manufacturing plant consists of 2 x 100 TPD Rotary kiln and 2 x 2 MW Waste Heat Recovery Boiler (WHRB). The Ferro Alloys unit will be set up by Rally Tech Services, where as Sponge Iron unit will be established based on Lurgi based technology.

The details of the proposed project are given in **Table 10.1,** the site Features of the proposed Project is given in **Table: 10.2.** The Technical Details of the Proposed Project are given in **Table: 10.3.**

Table 10.1
Details of the proposed project

S. No	Type of the project	Capacity	Total Cost
1	Ferro Alloys (SiMn & FeMn) – Submerged Electric Arc Furnace (2 x 2.5 MVA)	12000 TPA	46 Crores
2	Sponge Iron (Rotary Kiln 2 x 100 TPD)	60000 TPA	
3	Power (WHRB 2 x 2 MW)	4 MW	

Table 10.2
Site Features of the Proposed Project (10km radius)

S. No	Particulars	Details
1	Location	Bijabhat Village, Bemetara Tehsil, Durg District, Chhattisgarh State
2	Geographical Positions	Longitude - 81°33'29.21"E to 81°33'38.55"E Latitude - 21°39'49.73"N to 21°40'1.22"N
3	Elevation	271 m
4	Land required for the Activity	14 Acres (5.66 Ha)
5	Present Land use	Private Land
6	Terrain	Agricultural land
7	Soil Type	Vertisol – clay & silt having black color
8	Seismicity Zone	Earth Quake Zone-II (Least to Moderate) as defined in IS: 1893-2002
9	Nearest Highway	National Highway 12A 2km NE
10	Nearest Major railway station	Tilda station 26km ESE
11	Nearest Airport	Mana (Raipur) 80 km,
12	Nearest Village	Bijabhat Village – 0.5 km, South
13	Nearest Town/City	Bemetara 6 km NNW
14	Monuments	None
15	Archaeologically important places	None
16	Reserved Forests	None
17	Water Body	Seonath River 4km SSE

Table 10.3
Technical Details of the Proposed Project

Equipment	Description
Ferro Alloys:	
Furnace Capacity	2 x 2.5 MVA
Products	Ferro Alloys: High carbon Ferro Manganese / Silicon Manganese & Medium Carbon Silicon Manganese
Furnace Type	Sub-Merged Electric Arc Furnace.
Max Temperature	1450^0C of flue gases
Poll Control Equipment	Spark Arrestor, Bag filter & Heat Exchanger
Cooling system	Copper tubes (inlet water temp 35 to 40ºC, Outlet water temp 45 to 50ºC)
Sponge Iron Unit:	
Proposed Capacity	2 X 100 TPD
Technologies	Coal based Customized / Indigenous Technology
Kiln Type	Refractory Lined Vessel
Max temperature	1000 to 1150 ºC
Fuel Proposed for Kiln	Coal Grade 'F'
Annual Fuel requirement	85,000 TPA
Ash content	40%
Slag Generation	25,000 TPA
WHRB (Waste Heat Recovery Boiler):	
Capacity	4 MW
Source	Waste heat from Flue Gases

10.3 BASIC REQUIREMENTS

10.3.1 Land

The proposed land is completely private land which is single crop agricultural land, the total land is 14 acres (5.66 Ha) and the proposed Greenbelt area is 4.77 acres (1.93 Ha).

10.3.2 Raw Material

The main raw materials required for the proposed project are Manganese ore, Pearl carbon reducer, Dolomite, Quartz and Carbon electrode paste for Ferro Alloy unit and Iron ore, Dolomite and Coal for Sponge Iron plant. The details of the main raw materials required are given in **Table 10.4**.

Table 10.4:
Details of Raw Materials Requirement

Plant	Raw material	Quantity (TPA)	Source
Sponge Iron	Iron ore	110000	NMDC & Orissa mines
	Coal	85000	SECL linkage
	Dolomite	5000	Local market
Ferro Alloys plant	Manganese ore	13000	From mines located in Central India
	Carbon Reducer	1850	
	Dolomite / Magnesite	1500	
	Quartz	500	
Power plant (WHRB)	Waste heat from flue gases	NA	In house
Note: Transportation of all raw materials will be by trucks, all trucks meeting the latest GOI emissions standards will be used			

10.3.3 Water

The total water required from the project will be taken from the groundwater (borewell) within the plant premises, necessary permission will be obtained from the State Ground Water / Central Ground Water Board. The detailed breakup of the water required for various activities are given in **Table 10.5.**

Table 10.5:
Water Requirement m^3/day

S. No	Description	m^3/day	Source
1	Boiler (Power Plant)	50	Bore well within plant site
2	Cooling Purpose	80	
3	Domestic Purpose	20	
4	Gardening	20	
	Total	**170**	

10.3.4 Power Evacuation

The part of the power required will be taken from its proposed WHRB power plant and remaining from Chhattisgarh State Electricity Board. The details of the power required for proposed project are given in **Table 10.6.**

Table 10.6:
Details of Power Requirement

Plant	Power required	Source
Sponge Iron plant	2 MW	Captive (WHRB) power plant & from CSEB
Ferro Alloys plant	4 MW	
Total	**6 MW**	

10.3.5 Man Power Requirement

The man power required for the project will be sourced from nearby areas to the maximum extent in case of non availability of skilled persons, they will be engaged from other parts. The details of the man power during construction period and operation period are given in **Table 10.7**.

Table 10.7:
Manpower Details

Plant	Managerial	Supervisory	Skilled	Unskilled	Total
Sponge Iron	8	7	25	60	100
Ferro Alloys	3	4	15	29	51
Power (WHRB)	3	5	18	14	40
Total	**14**	**16**	**58**	**103**	**191**
Preference will be given for local villages and neighboring areas					

10.4. BASELINE ENVIRONMENTAL STATUS

10.4.1 Meteorology

On site monitoring was undertaken during winter season the winds were predominantly recorded from North East closely followed by North & East during this time period. Calm conditions prevailed for 9.92% of the total time. Averaged wind speed for the season that is December 2010 to February 2011 is 1.6 m/sec.

10.4.2 Ambient Air Quality

Ambient Air Quality Monitoring (AAQM) was carried out at 10 locations within 10 Km peripheral of the project site. AAQ locations were selected in downwind, cross wind and upwind directions of the proposed plant location. AAQ levels are recorded are given below **Table 10.8**.

Table 10.8:
Ambient Air Quality levels in the study area- $\mu g/m^3$

S.No	Parameter		Min	Max	CPCB, Limits
1	SPM		66	148	---*
2	RPM	$PM_{2.5\mu}$	13	32	60
3		$PM_{10\mu}$	25	55	100
4	SO_2		6.1	12.1	80
5	NO_x		9.0	18.2	80
6	O_3		BDL	BDL	100
7	Benzene		BDL	BDL	05

*No Standard for SPM

10.4.3 Noise levels in the study area

Baseline noise levels are monitored at 10 locations in the study area and found that noise levels are within the Residential prescribed limits.

10.4.4 Water Quality

Ground water samples at 10 locations and surface water samples at 2 locations were collected in the study area and analyzed to assess the water quality.

Ground Water Quality – Observations

- The pH of water samples varied from 7.20 to 7.52
- The Total Dissolved Solids are in the range of 178 mg/l to 205 mg/l.
- The chloride values are in the ranges of 22 mg/l to 40 mg/l.
- The fluoride values are in the rage of 0.10 mg/l to 0.22 mg/l.

Surface Water Quality – Observations

- The pH of the surface water is in the range of 7.60 to 7.90
- The Total Dissolved Solids are in the range of 182 mg/l to 190 mg/l
- The Fluoride values are in the range of 0.4 mg/l to 0.6 mg/l
- The Total Hardness is in the order of 67 mg/l to 102 mg/l
- The total chlorides are in the order of 18 mg/l to 39 mg/l

10.4.5 Soil Quality

Soil quality studies are performed around the project site. Soil samples were

collected from 8 locations at various depths and physico-chemical characteristics of the collected samples were analyzed.

10.4.5.1 Soil Quality – Observations

- The soil quality analysis indicates the soils are predominantly in Balkish brown.
- The pH of soil indicates normal to saline nature (7.2 to 7.5)
- Available Nitrogen in the soil observed to be between 563 to 600 kg/ha, Phosphorous levels observed to be between 45 to 50 kg/ha and Potassium observed to be between 114 to 150 kg/ha

10.4.6 Environmental sensitive areas

Study was carried out to identify environmental sensitive areas within 15 Km peripheral of the project site and found that there are no Sanctuary, Elephant/Tiger reserve (existing as well as proposed), migratory roots within 15 Km of the project site.

10.5. ENVIRONMENTAL IMPACTS OF THE PROPOSED PROJECT

The proposed power plant may cause impact on the environment in two phases.

- During construction phase
- During Operation phase

10.5.1 Impact during Construction Phase

Increase in SPM, RPM (PM_{10} & $PM_{2.5}$), SO_2, NO_X & CO levels due to construction activities and movement of vehicles. The impact of these activities would be temporary and will be confined within the project boundary. The important dust suppression measures proposed will be regular water sprinkling on main haul roads in the project area.

During construction activity all the equipments washed and the wastewater will be diverted to working pit to arrest the suspended solids if any and the settled water will be reused for construction purposes. During site development necessary precautions will be taken, so that the runoff water from the site gets collected to working pit and if any overflow which, will be diverted to nearby greenbelt/ plantation area.

All noise generating equipments will be used during day time for a brief period of its requirement. Proper enclosures will be used for reduction in noise levels. The

proposed site is private land however the existing trees and shrubs which does not come in the construction area will be retained as greenbelt. Overall, there will not be any adverse impact on the surroundings during the construction period.

10.5.2 Impacts during Operation Phase & Mitigation Measures

10.5.2.1 Air Quality

The exhaust gas from rotary kiln and pollutants like SPM, SO_2, and NOx from coal combustion from sponge iron unit and gas emission from ferro alloys furnace are considered. The main sources of fugitive emissions are raw material unloading, raw material handling, material transfer points, storage bin area etc. The exit gases from kiln, after recovery of the sensible heat in WHRB, will be passed through an ESP (design norm 50 mg/Nm^3) to control the dust emissions into ambient and provide stack for dispersion of gases

In order to assess the cumulative impact the emissions from sponge iron, ferro alloys are considered together to assess the incremental GLCs (Ground Level Concentrations) of SPM, SO_2, NOx using ISCST 3 Dispersion Model. The Stack and Emission Details of Proposed Units are given in **Table 10.9.**

Table 10.9:
Stack and Emission Details of Proposed Units

Details	Units	Ferro Alloys	Sponge Iron After WHRB
Plant capacity	-	2X9 MVA	4 MW
Fuel Consumption	TPD	-	232 (Coal)
Height of the stack	m	30	60
Dia. of stack	m	1.0	2.0
Temp of flue gas	^oC	160	164
Velocity of flue gas	m/s	3.5	4.4
Ash content	%	-	27
Sulphur Content	%	-	0.63
SPM Emissions	g/s	0.13	0.69
SO_2 Emissions	g/s	-	6.11
NO_x Emissions	g/s	-	10.42

The Predicted maximum GLCs of PM_{10}, SO_2 and NO_x concentrations considering 24 hour mean meteorological data of study season are superimposed on the maximum baseline concentrations obtained during the study period to estimate the post project scenario, which would prevail at the post operational phase. The overall scenario

with predicted concentrations over the maximum baseline concentrations is shown in the following **Table 10.10.**

Table 10.10

Post Project Scenario-*Units:* μg/m³

Particulars	Particulate Matter (PM_{10})	Sulphur dioxide (SO_2)	Oxides of Nitrogen (NO_X)
Baseline Scenario (Max)	62.0	14.4	29.2
Predicted GLC (Max)	0.93	4.03	6.88
Overall Scenario (Worst Case)	**62.93**	**18.43**	**36.08**
MOEF / CPCB Standards (As per MOEF notification – 2009)	**100**	**80**	**80**

The predicted ground level concentrations are superimposed on the baseline levels. The post project pollution levels are found to be within the CPCB limits.

Air Pollution Mitigation Measures

The following methods of abatement will be employed for the air pollution control.

- To control and limit particulate matter to 50 mg/Nm³ in the Ferro Alloys unit cyclone and bag filter is proposed
- To control & limit Particulate matter to 50 mg/Nm³ in the flue gas, highly efficient (99.9%) ESPs are proposed.
- To reduce NOx emission, steam generators would be fitted with advanced low NOx burners. NOx generation in steam generators would be limited to 750 mg/Nm³ in accordance with World Bank norms. The NOx emissions would be checked for Ground Level Concentrations (GLC's) as per Indian Emission Regulations.
- Coal dust would be generated generally at the conveyor transfer points, coal unloading area and coal stock pile area. Hence, coal transfer points and coal stock yard would be provided with dust suppression/dust extraction facilities.
- Dust collection system would also be provided in coal bunkers to evacuate dust and hazardous gases like Methane from the coal bunkers. Collected dust would be returned to either the associated belt conveyor or to the coal bunker. The dust collector outlet emission would be restricted to 50 mg/Nm³.
- Internal roads will be concreted / asphalted to reduce fugitive emissions
- 100% slag will be collected and given to the land filling and tiles manufacturing and road development

- 100% char will be used as fuel in FBC, coal briquettes.
- Hydro bins will be provided to collect bottom ash for further disposal to the users.

Air Quality Monitoring

Stack Gas Monitoring

The emissions from the stack will be monitored continuously using stack monitoring equipment for sulphur dioxide, oxides of nitrogen and particulate matter.

The ambient air quality will be monitored for SPM, RPM (PM_{10} & $PM_{2.5}$), SO_2, NOx, as per the direction of the State Pollution Control Board.

10.5.2.2 Water Quality

Water required for the proposed project will be met from Ground water. Necessary Permission from concern authority will be taken. Details of effluent generation and Water balance are given below **Table 10.11.**

Table 10.11:
Water Balance – KLD

Particulars	Raw Water	Wastewater	Loss	Discharge
Boiler (Power Plant)	50	5	45	ETP / reuse
Cooling Purpose	80	8	72	
Domestic Purpose	20	18	2	STP/ GB
Gardening	20	-	20	-
Total	**170**	**31**	**139**	

Water Pollution Mitigation Measures

Process wwastewater will be treated in Effluent Treatment Plant and will be reused for dust suppression. The Sanitary (domestic) Wastewater will be led in closed drains to Biological Treatment Plant (Septic Tank) and the treated water will be used for Greenbelt. Zero effluent discharge is proposed in the proposed project.

Water Quality Monitoring

Ground and surface water quality, effluent quality, noise levels monitoring etc. will be regularly monitored and reported to local SPCB and also MoE&F, GOI.

10.5.2.3 Solid Waste Generation and its Reuse

Details of solid waste generation from proposed project are given in **Table 12.** No hazardous waste will be generated due to proposed project activities, however the total expected slag to be generated will be about 10,000 TPA and char will be

generated about 25,000 TPA. Necessary industries will be identified in and around the proposed project area for utilization of the Char/Dolochar for fuel in FBC, Coal Briquettes, tiles manufacturing & Slag will be used for land filling and tiles manufacturing.

Table 10.12:
Solid waste generation

S. No.	Description	Quantity	Remarks
1	Char/Dolo Char	25500 TPA	Used as fuel for FBC, tiles manufacturing and coal briquettes
2	Bottom Ash	5740 TPA	Cement industries
3	Slag (Ferro alloys)	2400 TPA	Land filling& Tiles Manufacturing
4	Sewage sludge	35 kg/day	Used as manure for greenbelt

10.5.2.4 Noise Impact

The major activities which generate noise in the project are crusher units, generator, and electric arc furnace. All necessary measures would be taken to minimize the noise emissions at source. Adequate Equipment will be designed to 85 dB(A) to meet ambient noise levels as per the OSHA regulations.

10.5.2.5 Impact on Land Environment

The wastewater will be treated and used for greenbelt and excess treated wastewater discharged on land for irrigation or inland waters meeting MOEF/CPCB guidelines, hence there will be no impact envisaged due to the proposed project on soil quality.

Impact on Ecology

The impact on the flora of the area due to the operation of the project will mainly occur from the deposition of pollutants through air medium. However these fugitive emissions will be controlled using water sprinkling. Necessary regulatory and statutory steps will be undertaken for Green Belt Plantation in consultation with the state forest department authorities within the project sites.

10.6 Budgetary Provision for EMP

In order to comply with the environmental protection measures as suggested in the above sections, the management has made a budgetary provision for Environmental Protection and Safety measures. The estimated cost of the overall project, amount allocated to Environmental Management Cost towards Environmental Mitigation Measures both capital and recurring are given in **Table 13.**

Table 13:
Cost towards Environmental Mitigation Measures

S.No	Particulars	Capital Cost (Rs. in Lakhs)	Recurring Cost (Rs. In Lakhs)
1	Ferro Alloys unit – Bag filter and dust suppression units	60	6
2	Sponge Iron unit – Bag filter and dust suppression units	60	6
3	Power Plant – ESP, ETP, Stack, etc	300	30
4	STP, Rainwater harvesting, storm water drains, etc	30	4
5	Greenbelt development, miscellaneous	10	
	Total	**460**	**46**
Capital cost of the project (Ferro Alloys+ Sponge Iron + WHRB) = 4600 Lakhs			

10.7 CSR (Corporate Social Responsibility) Activities

An amount equivalent of 5% of the total cost of the project is earmarked towards CSR Activities initially during construction period and later on need based allotment of funds will be done for taking up CSR activities by keeping a separate fund using minimum of 2% of profit share.

Also, the project proponent will further be providing some of the welfare measures listed below:

- Local manpower will be preferred for employment depending upon their merit and qualifications.
- Supports to the local village community in Health camps, medical Aids.
- Support to the local youth for seeking higher education.
- Assist in tree plantation program.

10.8 Socio-economic Development

The impacts of the proposed plant during operation of plant on demography and socio economic conditions would be positive, some of them are as follows.

- Increase in employment opportunities and Reduction in migrants to outside for employment.
- Growth in services sector
- Increase in consumer prices of indigenous produce and services, land prices, house rent rates and Labour prices.
- Improvement in socio cultural environment of the study area.
- Improvement in transport, communication, health and educational services.

- Increase in employment due to increased business, trade and commerce and service sector.

10.9 Conclusion

The EIA study has made an overall assessment of the potential environmental impacts likely to arise from the proposed plant. The impact predictions indicate that the maximum GLC levels of PM, SO_2 and NO_x superimposed on the baseline levels the expected impacts are minimized within a <1km in the North East direction from the release of pollutant from the stacks and were well within the prescribed limits of CPCB standards.

The wastewater from plant units will be in effluent treatment plant as per the stipulated guidelines. Treated effluent will be reused at maximum extent within the plant premises for water sprinkling to control dust and for greenbelt purposes. Hence Zero discharge concept will be implemented. Necessary industries will be identified in and around the proposed project area for utilization of the Char/Dolochar for fuel in FBC, Coal Briquettes, tiles manufacturing & Slag will be used for land filling and tiles manufacturing.

Mitigation measures are proposed to minimise the adverse impacts if any due to the activity of proposed plant in the form of EMP. Also provision will be made towards CSR activities. The overall impact on the socio economic environment will be beneficial.